

REMARKS/ARGUMENTS

Prior to the Office Action, claims 1-30 were pending. Within the Office Action, claims 1-30 are rejected. By the above amendments, claims 1 and 16 are amended. Accordingly claims 1-30 are currently pending in this application.

Rejections under 35 U.S.C. 103(a)

Within the Office Action, the claims 1-30 are rejected under 35 U.S.C. §103(a) as being unpatentable over Japanese Patent No. 7-283104 (hereinafter "Japan '104") in view of either U.S. Patent No. 6,612,317 to Constantini et al. (hereinafter "Constantini") or U.S. Patent No. 6,874,513 to Yamagata et al. (hereinafter "Yamagata"). For the reasons fully outlined below, the Applicants respectfully traverse the rejections made within the Office Action and submit that the claims as presented above are in condition for allowance over Japan '104 in view of either Constantini or Yamagata.

Japan '104

Japan '104 is directed to a chemical application device including a manual chemical supplier 33, a chemical container 1d, and nozzles 9a-9d. The chemical supplier 33 is connected to the nozzle 9d via a check valve 4d. The chemical container 1d is connected to the chemical container 1d. The chemical supplier 33 approximates a syringe including a piston 35 that is manually pushed up and down within a cylinder 34. Pushing the piston 35 up draws chemical 2d from within the chemical container 1d into a cylinder 34. Pushing the piston 35 down forces the chemical collected in the cylinder 34 past the check valve 5d and out the nozzle 9d. Since the chemical supplier 33 is manually operated, the chemical application device can only be used to deliver fluid out of the nozzles 9a-9d at approximately normal air pressures. It is not possible to deliver a fluid into a high pressure environment using such a manual process.

Constantini

Constantini describes a system for supercritical processing that includes a process chamber 37 and provides for "steady-state operation of fluid flow and byproducts recovery while the process chamber is brought rapidly and repeatedly on and off line as in batch operations and for various process steps." [Abstract.] The system includes two check valves 67, 68 that are coupled through a control valve 45 with the process chamber. A feed pump 23 is configured to force fluid through the check valves. Supercritical processing by its vary nature relates to high pressure environments. The system disclosed in the cited portion of Constantini can inject fluid chemistry into the process chamber. Injection occurs when heated, high-pressure fluid is

released from a heater 42 through a check valve 67 and through the control valve 45. Such a system is specifically designed for the high-pressure environment associated with supercritical processing.

Yamagata

Yamagata describes a system for high-pressure processing including high pressure processing chamber 30,31 and a common chemical liquid supply unit 2A for supplying the chemical liquid to each high-pressure processing chambers. The system includes parallel structures, but only one need be considered to illustrate its basic operation. The system includes a high pressure fluid pump 12 connected through a heater 13 and a valve 14 with the mixer 29. Further, a chemistry supply reservoir 22 is coupled through a chemistry pump 23 and a chemistry valve 27 with the mixer 29. The chemistry and the high pressure fluid freely mix within the delivery line prior to the mixer 29. After the mixer 29, fluid moves through the heater 33 into the processing chamber 31. The system of Yamagata can inject chemistry from various reservoirs (e.g. 10, 20, 22) into the chamber 31. The pump 12 produces flow through the valve 15 into the chamber 31. According to Yamagata, the valve 15 is a "high-pressure valve." [Column 7, lines 1-2.] Elsewhere, Yamagata notes that high-pressure valves have an "opening/closing mechanism." [Column 7, line 44.] Similarly to Constantini, the system of Yamagata is specifically designed for a high-pressure environment.

Within the Office Action, it is stated that it would have been obvious to modify the device of Japan '104 to employ a supercritical fluid and chamber as taught by either Constantini or Yamagata. As discussed above, the chemical injection system of Japan '104 is a manual system, and the systems of Constantini and Yamagata are both specifically designed for high pressure environments. Since it is not possible to deliver a fluid into a high pressure environment using the manual process Japan '104, the combination of Japan '104 and either Constantini or Yamagata is not possible. Therefore, the proposed combination of Japan '104 in view of either Constantini or Yamagata is not proper.

The independent Claim 1 describes an apparatus for use in a system for supercritical processing of an object with a fluid, comprising means for injecting a processing chemistry into the system for supercritical processing, including means for starting and means for stopping the means for injecting; and means for substantially preventing fluid from re-entering the means for injecting during supercritical processing. As discussed above, the proposed combination of Japan '104 in view of either Constantini or Yamagata is not proper. For at least these reasons, Claim 1 is allowable over the teachings of Japan '104 in view of either Constantini or Yamagata.

Claims 2-15 depend from Claim 1. As described above, Claim 1 is allowable over the teachings of Japan '104 in view of either Constantini or Yamagata. Accordingly, Claims 2-15 are allowable as being dependent on an allowable base claim.

The independent Claim 16 describes a system for supercritical processing of an object with a fluid. The system comprises a high-pressure process chamber, means for injecting a processing chemistry into the high-pressure process chamber including means for starting and means for stopping the means for injecting, and means for substantially preventing fluid from re-entering the means for injecting during supercritical processing. As discussed above, the proposed combination of Japan '104 in view of either Constantini or Yamagata is not proper. For at least these reasons, Claim 16 is allowable over the teachings of Japan '104 in view of either Constantini or Yamagata.

Claims 17-29 depend from Claim 16. As described above, Claim 16 is allowable over the teachings of Japan '104 in view of either Constantini or Yamagata. Accordingly, Claims 17-29 are allowable as being dependent on an allowable base claim.

Within the Office Action, Claim 30 is rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,509,431 to Smith Jr. et al. (hereinafter "Smith") in view of Japan '104.

As with Constantini and Yamagata, Smith is directed to a high pressure system. In particular, Smith describes a precision cleaning system including a high pressure vessel 10, a circulation loop (45, 48, 49) coupled to an inlet line (38, 39, 26) for introducing fluid into the circulation loop. The inlet line includes a control valve 26, a check valve 39 and a pump 38. The system of Smith is specifically designed to function in a high pressure environment. Therefore, since it is not possible to deliver a fluid into a high pressure environment using the manual process Japan '104, the combination of Smith and Japan '104 is not possible. Therefore, the proposed combination of Smith in view of Japan '104 is not proper.

Claim 30 describes a supercritical processing system for processing a semiconductor wafer with a fluid, the fluid being from a fluid source. The system comprises a circulation loop coupled to a high-pressure processing chamber, and an inlet line for introducing the fluid into the circulation loop. The inlet line includes an inlet port in the circulation loop, a back-pressure regulator coupled to the inlet port, a pump for compressing the fluid to form a pressurized fluid, a first line for transferring the pressurized fluid from the pump to the back-pressure regulator, the first line configured to maintain a uni-directional flow of the pressurized fluid from the pump towards the back-pressure regulator, and a second line for transferring a quantity of the fluid from the fluid source to the pump, the second line configured to maintain a uni-directional flow of the fluid from the fluid source to the pump. As discussed above, the proposed combination of

Smith in view of Japan '104 is not proper. For at least these reasons, Claim 30 is allowable over the teachings of Smith in view of Japan '104.

CONCLUSION

In view of the foregoing, Applicant believes all claims now pending in this application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested. If the Examiner believes that a telephone conference would expedite prosecution of this application, the Examiner is encouraged to contact the undersigned at (408) 530-9700.

Respectfully submitted,
HAVERSTOCK & OWENS LLP

Dated: 4-27-06

By: 

Thomas B. Haverstock
Reg. No.: 32,571
Attorneys for Applicant

CERTIFICATE OF MAILING (37 CFR § 1.8(a))

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